ELD Standards Mapping
ELD Standard 3: Language for Mathematics
Grades K-12

The English Language Development (ELD) Standards Mapping Documents are designed to show the connections between the ELD Language Expectations for the five ELD Standards and the content standards for English Language Arts, Mathematics, Science and Social Studies, as well as support integration of the ELD Language Expectations and content to support Multilingual Learners' (ML) learning. This specific ELD Standards Mapping Document focuses on ELD *Standard 3: Language for Mathematics*.

The mapping document can be used by all teachers of MLs to explore the connections between language and content for a variety of purposes, such as developing and aligning curriculum, planning instruction, and co-teaching.

Please note that Standard 1 is not included in this Mapping Document. Standard 1 applies across a range of educational settings and is embedded throughout *ELD Standard 3: Language for Mathematics*. This moves beyond the binary view of social language as a precursor to academic language and views students' everyday language as a legitimate component of academic language development and part of the system of choices students make in order to most effectively meet activity purpose and other contextual variables. The emphases in Standard 1 have heightened attention to the notion that language, social-emotional, and cognitive development are interrelated processes that contribute to students' success in school and beyond. As students make their thinking visible, they communicate to learn, to convey personal needs and wants, to affirm their own identities, and to form and maintain relationships (WIDA 2020). Standard 1 can also be interwoven throughout Mathematics instruction.

The charts below appear in order of the ELD SCOS grade-level clusters (K, 1, 2-3, 4-5, 6-8, 9-12) in the left column with the connected Mathematics standards in the right columns. Shading is used throughout the document to assist viewers in identifying mapping for each language expectation. This document does not include an exhaustive list of the possible connections. Educators should use their knowledge of the ELD standards and their professional judgment when selecting ELD language expectations and Mathematics standards for integration.

ELD-MA.K.Inform.Interpretive	Kindergarten
Interpret mathematical informational texts (with prompting and support) by: Identifying concept or object	**NC.K.CC.4** Understand the relationship between numbers and quantities. • When counting objects, say the number names in the standard order, pairing each object with one and only one number name and each number name with one and only one object (one-to-one correspondence). • Recognize that the last number named tells the number of objects counted regardless of their arrangement (cardinality). • State the number of objects in a group, of up to 5 objects, without counting the objects (perceptual subitizing). **NC.K.CC.5** Count to answer "How many?" in the following situations: • Given a number from 1–20, count out that many objects. • Given up to 20 objects, name the next successive number when an object is added, recognizing the quantity is one more/greater. • Given 20 objects arranged in a line, a rectangular array, and a circle, identify how many. • Given 10 objects in a scattered arrangement, identify how many **NC.K.G.1** Describe objects in the environment using names of shapes, and describe the relative positions of objects using positional terms.

Language Expectation | **Connected Grade-Level or Course-Specific Content Standards**

(annotated format)

ELD Standard 3: Language for Mathematics
Kindergarten

ELD-MA.K.Inform.Interpretive	Kindergarten
Interpret mathematical informational texts (with prompting and support) by: Identifying concept or object	**NC.K.CC.4** Understand the relationship between numbers and quantities. • When counting objects, say the number names in the standard order, pairing each object with one and only one number name and each number name with one and only one object (one-to-one correspondence). • Recognize that the last number named tells the number of objects counted regardless of their arrangement (cardinality). • State the number of objects in a group, of up to 5 objects, without counting the objects (perceptual subitizing). **NC.K.CC.5** Count to answer "How many?" in the following situations: • Given a number from 1–20, count out that many objects. • Given up to 20 objects, name the next successive number when an object is added, recognizing the quantity is one more/greater. • Given 20 objects arranged in a line, a rectangular array, and a circle, identify how many. • Given 10 objects in a scattered arrangement, identify how many **NC.K.G.1** Describe objects in the environment using names of shapes, and describe the relative positions of objects using positional terms.
Interpret mathematical informational texts (with prompting and support) by: Describing quantities and attributes	**NC.K.MD.1** Describe measurable attributes of objects; and describe several different measurable attributes of a single object. **NC.K.MD.2** Directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute, and describe the difference. **NC.K.G.1** Describe objects in the environment using names of shapes, and

	describe the relative positions of objects using positional terms.
ELD-MA.K.Inform.Expressive	Kindergarten
Construct mathematical informational texts (with prompting and support) that: Define or classify concept or entity	**NC.K.CC.3** Write numbers from 0 to 20. Represent a number of objects with a written numeral 0-20, with 0 representing a count of no objects. **NC.K.CC.4** Understand the relationship between numbers and quantities. • When counting objects, say the number names in the standard order, pairing each object with one and only one number name and each number name with one and only one object (one-to-one correspondence). • Recognize that the last number named tells the number of objects counted regardless of their arrangement (cardinality). • State the number of objects in a group, of up to 5 objects, without counting the objects (perceptual subitizing).
Construct mathematical informational texts (with prompting and support) that: Describe a concept or entity	**NC.K.CC.5 Count to answer "How many?" in the following situations**: • Given a number from 1–20, count out that many objects. • Given up to 20 objects, name the next successive number when an object is added, recognizing the quantity is one more/greater. • Given 20 objects arranged in a line, a rectangular array, and a circle, identify how many. • Given 10 objects in a scattered arrangement, identify how many. **NC.K.G.1** Describe objects in the environment using names of shapes, and describe the relative positions of objects using positional terms.
Construct mathematical informational texts (with prompting and support) that: Compare/contrast concepts or entities	**NC.K.CC.6** Identify whether the number of objects, within 10, in one group is greater than, less than, or equal to the number of objects in another group**,** by using matching and counting strategies. **NC.K.CC.7** Compare two numbers, within 10, presented as written numerals

	NC.K.MD.2 Directly compare two objects with a measurable attribute in common, to see which object has “more of”/“less of” the attribute, and describe the difference. **NC.K.G.4** Analyze and compare two- and three-dimensional shapes, in different sizes and orientations, using informal language to describe their similarities, differences, attributes and other properties**.**

ELD Standard 3: Language for Mathematics
Grade 1

ELD-MA.1.Inform.Interpretive	Grade 1
Interpret mathematical informational texts by: Identifying concept or entity	**NC.1.MD.4** Organize, represent, and interpret data with up to three categories. • Ask and answer questions about the total number of data points. • Ask and answer questions about how many in each category. • Ask and answer questions about how many more or less are in one category than in another. **NC.1.MD.5** Identify quarters, dimes, and nickels and relate their values to pennies.
Interpret mathematical informational texts by: Describing attributes and characteristics	*Note: Standard 1 applies across standards and should be integrated throughout mathematics.
ELD-MA.1.Inform.Expressive	**Grade 1**
Construct mathematical informational texts that: Define or classify concept or entity	*Note: Standard 1 applies across standards and should be integrated throughout mathematics.
Construct mathematical informational texts that: Describe a concept or entity	*Note: Standard 1 applies across standards and should be integrated throughout mathematics.
Construct mathematical informational texts that: Compare/contrast concepts or entities	**NC.1.NBT.3** Compare two two-digit numbers based on the value of the tens and ones digits, recording the results of comparisons with the symbols >, =, and < **NC.1.MD.1** Order three objects by length; compare the lengths of two objects indirectly by using a third object.

ELD Standard 3: Language for Mathematics
Grades 2-3

ELD-MA.2-3.Explain.Interpretive	Grade 2	Grade 3
Interpret mathematical explanations by: Identifying concept or entity	**NC.2.NBT.8** Mentally add 10 or 100 to a given number 100–900, and mentally subtract 10 or 100 from a given number 100–900. **NC.2.MD.3** Estimate lengths in using standard units of inches, feet, yards, centimeters, and meters **NC.2.MD.4** Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit. **NC.2.MD.6** Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points and represent whole-number sums and differences, within 100, on a number line.	**NC.3.OA.7** Demonstrate fluency with multiplication and division with factors, quotients and divisors up to and including 10. • Know from memory all products with factors up to and including 10. • Illustrate and explain using the relationship between multiplication and division. • Determine the unknown whole number in a multiplication or division equation relating three whole numbers. **NC.3.NF.1** Interpret unit fractions with denominators of 2, 3, 4, 6, and 8 as quantities formed when a whole is partitioned into equal parts; • Explain that a unit fraction is one of those parts. • Represent and identify unit fractions using area and length models **NC.3.NF.2** Interpret fractions with denominators of 2, 3, 4, 6, and 8 using area and length models. • Using an area model, explain that the numerator of a fraction represents the number of equal parts of the unit fraction. • Using a number line, explain that the numerator of a fraction represents the number of lengths of the unit fraction from 0.

Interpret mathematical explanations by:
Analyzing plan for problem-solving steps
	NC.2.OA.1 Represent and solve addition and subtraction word problems, within 100, with unknowns in all positions, by using representations and equations with a symbol for the unknown number to represent the problem, when solving:
	• One-Step problems:
	  ◦ Add to/Take from-Start Unknown
	  ◦ Compare-Bigger Unknown
	  ◦ Compare-Smaller Unknown
	• Two-Step problems involving single digits:
	• Add to/Take from- Change Unknown
	• Add to/Take From- Result Unknown
		NC.3.OA.8 Solve two-step word problems using addition, subtraction, and multiplication, representing problems using equations with a symbol for the unknown number.
		
		NC.3.MD.2 Solve problems involving customary measurement.
		• Estimate and measure lengths in customary units to the quarter-inch and half-inch, and feet and yards to the whole unit.
		• Estimate and measure capacity and weight in customary units to a whole number: cups, pints, quarts, gallons, ounces, and pounds.
		• Add, subtract, multiply, or divide to solve one-step word problems involving whole number measurements of length, weight, and capacity in the same customary units.
		
		NC.3.OA.3 Represent, interpret, and solve one-step problems involving multiplication and division.
		• Solve multiplication word problems with factors up to and including 10. Represent the problem using arrays, pictures, and/or equations with a symbol for the unknown number to represent the problem.
		• Solve division word problems with a divisor and quotient up to and including 10. Represent the problem using arrays, pictures, repeated subtraction and/or equations with a symbol for the unknown number to represent the problem.

Interpret mathematical explanations by: Evaluating simple pattern or structure	**NC.2.NBT.2** Count within 1,000; skip-count by 5s, 10s, and 100s	**NC.3.OA.9** Interpret patterns of multiplication on a hundreds board and/or multiplication table
ELD-MA.2-3.Explain.Expressive	Grade 2	Grade 3
Construct mathematical explanations that: Introduce concept or entity	**NC.2.MD.7** Tell and write time from analog and digital clocks to the nearest five minutes, using a.m. and p.m.	**NC.3.NF.3** Represent equivalent fractions with area and length models by: • Composing and decomposing fractions into equivalent fractions using related fractions: halves, fourths and eighths; thirds and sixths. • Explaining that a fraction with the same numerator and denominator equals one whole. • Expressing whole numbers as fractions, and recognize fractions that are equivalent to whole numbers.
Construct mathematical explanations that: Describe solution and steps used to solve problem with others	**NC.2.OA.4** Use addition to find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns; write an equation to express the total as a sum of equal addends.	**NC.3.NBT.2** Add and subtract whole numbers up to and including 1,000. • Use estimation strategies to assess reasonableness of answers. • Model and explain how the relationship between addition and subtraction can be applied to solve addition and subtraction problems. • Use expanded form to decompose numbers and then find sums and differences. **NC.3.NBT.3** Use concrete and pictorial models, based on place value and the properties of operations, to find the product of a one-digit whole number by a multiple of 10 in the range 10–90.

		NC.3.MD.1 Tell and write time to the nearest minute. Solve word problems involving addition and subtraction of time intervals within the same hour.
Construct mathematical explanations that: State reasoning used to generate solution	**NC.2.NBT.7** Add and subtract, within 1,000, relating the strategy to a written method, using: • Concrete models or drawings • Strategies based on place value • Properties of operations • Relationship between addition and subtraction **NC.2.MD.2** Measure the length of an object twice, using length units of different lengths for the two measurements; describe how the two measurements relate to the size of the unit chosen.	*Note: Standard 1 applies across standards and should be integrated throughout mathematics.
ELD-MA.2-3.Argue.Interpretive	**Grade 2**	**Grade 3**
Interpret mathematics arguments by: Identifying conjectures about what might be true	*Note: Standard 1 applies across standards and should be integrated throughout mathematics.	*Note: Standard 1 applies across standards and should be integrated throughout mathematics.
Interpret mathematics arguments by: Distinguishing connections among ideas in justifications	**NC.2.MD.10** Organize, represent, and interpret data with up to four categories. • Draw a picture graph and a bar graph with a single-unit scale to represent a data set. • Solve simple put-together, take-apart, and compare problems using information presented in a picture and a bar graph. **NC.2.MD.5** Use addition and subtraction, within 100, to solve word problems involving lengths that are given in the same units, using equations with a	*Note: Standard 1 applies across standards and should be integrated throughout mathematics.

	symbol for the unknown number to represent the problem. **NC.2.G.3** Partition circles and rectangles into two, three, or four equal shares. • Describe the shares using the words halves, thirds, half of, a third of, fourths, fourth of, quarter of. • Describe the whole as two halves, three thirds, four fourths. • Explain that equal shares of identical wholes need not have the same shape	
Interpret mathematics arguments by: Extracting mathematical operations and facts from solution strategies to create generalizations	**NC.2.OA.1** Represent and solve addition and subtraction word problems, within 100, with unknowns in all positions, by using representations and equations with a symbol for the unknown number to represent the problem, when solving: • One-Step problems: ◦ Add to/Take from-Start Unknown ◦ Compare-Bigger Unknown ◦ Compare-Smaller Unknown • Two-Step problems involving single digits: ◦ Add to/Take from- Change Unknown ◦ Add to/Take From- Result Unknown **NC.2.OA.2** Demonstrate fluency with addition and subtraction, within 20, using mental strategies.	**NC.3.OA.1** For products of whole numbers with two factors up to and including 10: • Interpret the factors as representing the number of equal groups and the number of objects in each group. • Illustrate and explain strategies including arrays, repeated addition, decomposing a factor, and applying the commutative and associative properties. **NC.3.OA.2** For whole-number quotients of whole numbers with a one-digit divisor and a one-digit quotient: • Interpret the divisor and quotient in a division equation as representing the number of equal groups and the number of objects in each group. • Illustrate and explain strategies including arrays, repeated addition or subtraction, and decomposing a factor.

		NC.3.OA.3 Represent, interpret, and solve one-step problems involving multiplication and division. • Solve multiplication word problems with factors up to and including 10. Represent the problem using arrays, pictures, and/or equations with a symbol for the unknown number to represent the problem. • Solve division word problems with a divisor and quotient up to and including 10. Represent the problem using arrays, pictures, repeated subtraction and/or equations with a symbol for the unknown number to represent the problem. **NC.3.OA.8** Solve two-step word problems using addition, subtraction, and multiplication, representing problems using equations with a symbol for the unknown number. **NC.3.OA.9** Interpret patterns of multiplication on a hundreds board and/or multiplication table.
ELD-MA.2-3.Argue.Expressive	**Grade 2**	**Grade 3**
Construct mathematics arguments that: Create conjecture using definitions	*Note: Standard 1 applies across standards and should be integrated throughout mathematics.	*Note: Standard 1 applies across standards and should be integrated throughout mathematics.
Construct mathematics arguments that: Generalize commonalities across cases	**NC.2.NBT.4** Compare two three-digit numbers based on the value of the hundreds, tens, and ones digits, using >, =, and < symbols to record the results of comparisons. **NC.2.G.1** Recognize and draw triangles, quadrilaterals, pentagons, and hexagons, having	**NC.3.NF.4** Compare two fractions with the same numerator or the same denominator by reasoning about their size, using area and length models, and using the >, <, and = symbols. Recognize that comparisons are valid only when the two fractions refer to the same whole with denominators: halves, fourths and eighths; thirds and sixths.

	specified attributes; recognize and describe attributes of rectangular prisms and cubes. **NC.2.G.3** Partition circles and rectangles into two, three, or four equal shares. • Describe the shares using the words halves, thirds, half of, a third of, fourths, fourth of, quarter of. • Describe the whole as two halves, three thirds, four fourths. • Explain that equal shares of identical wholes need not have the same shape	
Construct mathematics arguments that: Justify conclusion steps and strategies in simple patterns	**NC.2.OA.2** Demonstrate fluency with addition and subtraction, within 20, using mental strategies.	*Note: Standard 1 applies across standards and should be integrated throughout mathematics.
Construct mathematics arguments that: Identify and respond to others' arguments	*Note: Standard 1 applies across standards and should be integrated throughout mathematics.	*Note: Standard 1 applies across standards and should be integrated throughout mathematics.

ELD Standard 3: Language for Mathematics
Grades 4-5

ELD-MA.4-5.Explain.Interpretive	Grade 4	Grade 5
Interpret mathematical explanations by: Identifying concept or entity	**NC.4.OA.1** Interpret a multiplication equation as a comparison. Multiply or divide to solve word problems involving multiplicative comparisons using models and equations with a symbol for the unknown number. Distinguish multiplicative comparison from additive comparison.	**NC.5.G.1** Graph points in the first quadrant of a coordinate plane, and identify and interpret the x and y coordinates to solve problems. **NC.5.MD.4** Recognize volume as an attribute of solid figures and measure volume by counting unit cubes, using cubic centimeters, cubic inches, cubic feet, and improvised units. **NC.5.MD.5** Relate volume to the operations of multiplication and addition. • Find the volume of a rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths. • Build understanding of the volume formula for rectangular prisms with whole-number edge lengths in the context of solving problems. • Find volume of solid figures with one-digit dimensions composed of two non-overlapping rectangular prisms. **NC.5.OA.3** Generate two numerical patterns using two given rules. • Identify apparent relationships between corresponding terms. • Form ordered pairs consisting of

		corresponding terms from the two patterns. • Graph the ordered pairs on a coordinate plane.
Interpret mathematical explanations by: Analyzing problem-solving steps	**NC.4.MD.2** Use multiplicative reasoning to convert metric measurements from a larger unit to a smaller unit using place value understanding, two-column tables, and length models. **NC.4.MD.3** Solve problems with area and perimeter. • Find areas of rectilinear figures with known side lengths. • Solve problems involving a fixed area and varying perimeters and a fixed perimeter and varying areas. • Apply the area and perimeter formulas for rectangles in real world and mathematical problems.	**NC.5.NF.7** Solve one-step word problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions using area and length models, and equations to represent the problem. **NC.5.MD.1** Given a conversion chart, use multiplicative reasoning to solve one-step conversion problems within a given measurement system.
Interpret mathematical explanations by: Evaluating a pattern or structure that follows a given rule	**NC.4.OA.5** Generate and analyze a number or shape pattern that follows a given rule.	**NC.5.MD.4** Recognize volume as an attribute of solid figures and measure volume by counting unit cubes, using cubic centimeter, cubic inches, cubic feet, and improvised units. **NC.5.OA.3** Generate two numerical patterns using two given rules. • Identify apparent relationships between corresponding terms. • Form ordered pairs consisting of corresponding terms from the two patterns. • Graph the ordered pairs on a coordinate plane.

ELD-MA.4-5.Explain.Expressive	Grade 4	Grade 5
Construct mathematical explanations that: Introduce concept or entity	**NC.4.NF.1** Explain why a fraction is equivalent to another fraction by using area and length fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. **NC.4.NF.6** Use decimal notation to represent fractions. • Express, model and explain the equivalence between fractions with denominators of 10 and 100. • Use equivalent fractions to add two fractions with denominators of 10 or 100. • Represent tenths and hundredths with models, making connections between fractions and decimals. **NC.4.G.2** Classify quadrilaterals and triangles based on angle measure, side lengths, and the presence or absence of parallel or perpendicular lines.	**NC.5.OA.2** Write, explain, and evaluate numerical expressions involving the four operations to solve up to two-step problems. Include expressions involving: • Parentheses, using the order of operations. • Commutative, associative and distributive properties.
Construct mathematical explanations that: Share solution with others	**NC.4.NBT.1** Explain that in a multi-digit whole number, a digit in one place represents 10 times as much as it represents in the place to its right, up to 100,000. **NC.4.NF.1** Explain why a fraction is equivalent to another fraction by using area and length fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size.	**NC.5.G.3** Classify quadrilaterals into categories based on their properties. • Explain that attributes belonging to a category of quadrilaterals also belong to all subcategories of that category. • Classify quadrilaterals in a hierarchy based on properties.
Construct mathematical explanations that: Describe data and/or steps to solve	**NC.4.MD.1** Know relative sizes of measurement units. Solve problems involving metric measurement.	**NC.5.MD.2 Represent and interpret data.** • Collect data by asking a question that

problem	• Measure to solve problems involving metric units: centimeter, meter, gram, kilogram, Liter, milliliter. • Add, subtract, multiply, and divide to solve one-step word problems involving whole-number measurements of length, mass, and capacity that are given in metric units. **NC.4.MD.3** Solve problems with area and perimeter. • Find areas of rectilinear figures with known side lengths. • Solve problems involving a fixed area and varying perimeters and a fixed perimeter and varying areas. • Apply the area and perimeter formulas for rectangles in real world and mathematical problems. **NC.4.MD.4** Represent and interpret data using whole numbers. • Collect data by asking a question that yields numerical data. • Make a representation of data and interpret data in a frequency table, scaled bar graph, and/or line plot. • Determine whether a survey question will yield categorical or numerical data.	yields data that changes over time. • Make and interpret a representation of data using a line graph. • Determine whether a survey question will yield categorical or numerical data, or data that changes over time.
Construct mathematical explanations that: State reasoning used to generate solution	**NC.4.OA.5** Generate and analyze a number or shape pattern that follows a given rule	*Note: Standard 1 applies across standards and should be integrated throughout mathematics.
ELD-MA.4-5.Argue.Interpretive	**Grade 4**	**Grade 5**
Interpret mathematics arguments by:	**NC.4.NF.2** Compare two fractions with different	**NC.5.NBT.1** Explain the patterns in the place

Comparing conjectures with patterns, and/or rules	numerators and different denominators, using the denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =, or <, and justify the conclusions by: • Reasoning about their size and using area and length models. • Using benchmark fractions 0, ½, and a whole. • Comparing common numerator or common denominators. **NC.4.NF.7** Compare two decimals to hundredths by reasoning about their size using area and length models, and recording the results of comparisons with the symbols >, =, or <. Recognize that comparisons are valid only when the two decimals refer to the same whole. **NC.4.NBT.7** Compare two multi-digit numbers up to and including 100,000 based on the values of the digits in each place, using >, =, and < symbols to record the results of comparisons. **NC.4.MD.2** Use multiplicative reasoning to convert metric measurements from a larger unit to a smaller unit using place value understanding, two-column tables, and length models.	value system from one million to the thousandths place. • Explain that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left. • Explain patterns in products and quotients when numbers are multiplied by 1,000, 100, 10, 0.1, and 0.01 and/or divided by 10 and 100. **NC.5.NBT.3** Read, write, and compare decimals to thousandths. • Write decimals using base-ten numerals, number names, and expanded form. • Compare two decimals to thousandths based on the value of the digits in each place, using >, =, and < symbols to record the results of comparisons.
Interpret mathematics arguments by: Distinguishing commonalities and differences among ideas in justifications	**NC.4.NF.3 Understand and justify decompositions of fractions with denominators of 2, 3, 4, 5, 6, 8, 10, 12, and 100.** • Understand addition and subtraction of fractions as joining and separating parts	*Note: Any of the problem-solving standards can be integrated with this language expectation.

	referring to the same whole. • Decompose a fraction into a sum of unit fractions and a sum of fractions with the same denominator in more than one way using area models, length models, and equations. • Add and subtract fractions, including mixed numbers with like denominators, by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction. • Solve word problems involving addition and subtraction of fractions, including mixed numbers by writing equations from a visual representation of the problem. **NC.4.G.2** Classify quadrilaterals and triangles based on angle measure, side lengths, and the presence or absence of parallel or perpendicular lines.	
Interpret mathematics arguments by: Extracting patterns or rules from solution strategies to create generalizations	**NC.4.MD.3** Solve problems with area and perimeter. • Find areas of rectilinear figures with known side lengths. • Solve problems involving a fixed area and varying perimeters and a fixed perimeter and varying areas. • Apply the area and perimeter formulas for rectangles in real world and mathematical problems. **NC.4.MD.8** Solve word problems involving addition and subtraction of time intervals that cross the hour. **NC.4.G.2** Classify quadrilaterals and triangles based	**NC.5.NF.3** Use fractions to model and solve division problems. • Interpret a fraction as an equal sharing context, where a quantity is divided into equal parts. • Model and interpret a fraction as the division of the numerator by the denominator. • Solve one-step word problems involving division of whole numbers leading to answers in the form of fractions and mixed numbers, with denominators of 2, 3, 4, 5, 6, 8, 10, and 12, using area, length, and set models or equations.

	on angle measure, side lengths, and the presence or absence of parallel or perpendicular lines.	**NC.5.G.3** Classify quadrilaterals into categories based on their properties. • Explain that attributes belonging to a category of quadrilaterals also belong to all subcategories of that category. • Classify quadrilaterals in a hierarchy based on properties. **NC.5.MD.5** Relate volume to the operations of multiplication and addition. • Find the volume of a rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths. • Build understanding of the volume formula for rectangular prisms with whole-number edge lengths in the context of solving problems. • Find volume of solid figures with one-digit dimensions composed of two non-overlapping rectangular prisms.
ELD-MA.4-5.Argue.Expressive	**Grade 4**	**Grade 5**
Construct mathematics arguments that: Create conjecture using definitions, patterns, and rules	**NC.4.NF.4** Apply and extend previous understandings of multiplication to: • Model and explain how fractions can be represented by multiplying a whole number by a unit fraction, using this understanding to multiply a whole number by any fraction less than one. • Solve word problems involving multiplication of	**NC.5.NF.4** Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction, including mixed numbers. • Use area and length models to multiply two fractions, with the denominators 2, 3, 4. • Explain why multiplying a given number

	a fraction by a whole number.	by a fraction greater than 1 results in a product greater than the given number and when multiplying a given number by a fraction less than 1 results in a product smaller than the given number. • Solve one-step word problems involving multiplication of fractions using models to develop the algorithm.
Construct mathematics arguments that: Generalize commonalities and differences across cases	**NC.4.OA.1** Interpret a multiplication equation as a comparison. Multiply or divide to solve word problems involving multiplicative comparisons using models and equations with a symbol for the unknown number. Distinguish multiplicative comparison from additive comparison. **NC.4.MD.3** Solve problems with area and perimeter. • Find areas of rectilinear figures with known side lengths. • Solve problems involving a fixed area and varying perimeters and a fixed perimeter and varying areas. • Apply the area and perimeter formulas for rectangles in real world and mathematical problems.	**NC.5.MD.5** Relate volume to the operations of multiplication and addition. • Find the volume of a rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths. • Build understanding of the volume formula for rectangular prisms with whole-number edge lengths in the context of solving problems. • Find volume of solid figures with one-digit dimensions composed of two non-overlapping rectangular prisms. **NC.5.NBT.3** Read, write, and compare decimals to thousandths. • Write decimals using base-ten numerals, number names, and expanded form. • Compare two decimals to thousandths based on the value of the digits in each place, using >, =, and < symbols to record the results of comparisons.
Construct mathematics arguments that:	**NC.4.NBT.5** Multiply a whole number of up to three	*Note: Standard 1 applies across standards and

Justify conclusions with patterns or rules	digits by a one-digit whole number, and multiply up to two two-digit numbers with place value understanding using area models, partial products, and the properties of operations. Use models to make connections and develop the algorithm. **NC.4.NBT.6** Find whole-number quotients and remainders with up to three-digit dividends and one-digit divisors with place value understanding using rectangular arrays, area models, repeated subtraction, partial quotients, properties of operations, and/or the relationship between multiplication and division.	should be integrated throughout mathematics.
Construct mathematics arguments that: Evaluate others' arguments	*Note: Standard 1 applies across standards and should be integrated throughout mathematics.	*Note: Standard 1 applies across standards and should be integrated throughout mathematics.

ELD Standard 3: Language for Mathematics
Grades 6-8

ELD-MA.6-8.Explain. Interpretive	Grade 6	Grade 7	Grade 8
Interpret mathematical explanations by: Identifying concept or entity	**NC.6.G.3** Use the coordinate plane to solve real-world and mathematical problems by: • Drawing polygons in the coordinate plane given coordinates for the vertices. • Using coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. **NC.6.RP.1** Understand the concept of a ratio and use ratio language to: • Describe a ratio as a multiplicative relationship between two quantities. • Model a ratio relationship using a variety of representations. **NC.6.RP.2** Understand that ratios can be expressed as equivalent unit ratios by finding and interpreting both unit ratios in context. **NC.6.NS.5** Understand and use rational numbers to: • Describe quantities having opposite directions or values.	**NC.7.RP.1** Compute unit rates associated with ratios of fractions to solve real-world and mathematical problems. **NC.7.G.2 U**nderstand the characteristics of angles and side lengths that create a unique triangle, more than one triangle or no triangle. Build triangles from three measures of angles and/or sides. **NC.7.G.4** Understand area and circumference of a circle. • Understand the relationships between the radius, diameter, circumference, and area. • Apply the formulas for area and circumference of a circle to solve problems. **NC.7.SP.5** Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring.	**NC.8.NS.1** Understand that every number has a decimal expansion. Building upon the definition of a rational number, know that an irrational number is defined as a non-repeating, non-terminating decimal. **NC.8.NS.2** Use rational approximations of irrational numbers to compare the size of irrational numbers and locate them approximately on a number line. Estimate the value of expressions involving: • Square roots and cube roots to the tenths. • π to the hundredths. **NC.8.EE.1** Develop and apply the properties of integer exponents to generate equivalent numerical expressions. **NC.8.F.1** Understand that a function is a rule that assigns to each input exactly one output. • Recognize functions when graphed as the set of ordered pairs consisting of an input and

	• Represent quantities in real-world contexts, explaining the meaning of 0 in each situation. • Understand the absolute value of a rational number as its distance from 0 on the number line to: • Interpret absolute value as magnitude for a positive or negative quantity in a real-world context. • Distinguish comparisons of absolute value from statements about order. **NC.6.NS.6** Understand rational numbers as points on the number line and as ordered pairs on a coordinate plane. a. On a number line: • Recognize opposite signs of numbers as indicating locations on opposite sides of 0 and that the opposite of the opposite of a number is the number itself. • Find and position rational numbers on a horizontal or vertical number line. b. On a coordinate plane: • Understand signs of		exactly one corresponding output. • Recognize functions given a table of values or a set of ordered pairs. **NC.8.G.2 U**se transformations to define congruence: • Verify experimentally the properties of rotations, reflections, and translations that create congruent figures. • Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations. • Given two congruent figures, describe a sequence that exhibits the congruence between them.

	numbers in ordered pairs as indicating locations in quadrants. • Recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes. • Find and position pairs of rational numbers on a coordinate plane. **NC.6.NS.7** Understand ordering of rational numbers. a. Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. b. Write, interpret, and explain statements of order for rational numbers in real-world contexts.		
Interpret mathematical explanations by: Analyzing possible ways to represent and solve a problem	**NC.6.RP.3** Use ratio reasoning with equivalent whole-number ratios to solve real-world and mathematical problems by: • Creating and using a table to compare ratios. • Finding missing values in the tables.	**NC.7.RP.3** Use scale factors and unit rates in proportional relationships to solve ratio and percent problems. **NC.7.EE.3** Solve multi-step real-world and mathematical problems posed with rational numbers in algebraic expressions.	**NC.8.EE.8** Analyze and solve a system of two linear equations in two variables in slope-intercept form. • Understand that solutions to a system of two linear equations correspond to the points of intersection of their graphs because the point of

	• Using a unit ratio. • Converting and manipulating measurements using given ratios. • Plotting the pairs of values on the coordinate plane. **NC.6.RP.4** Use ratio reasoning to solve real-world and mathematical problems with percents by: • Understanding and finding a percent of a quantity as a ratio per 100. • Using equivalent ratios, such as benchmark percents (50%, 25%, 10%, 5%, 1%), to determine a part of any given quantity. • Finding the whole, given a part and the percent. **NC.6.EE.6** Use variables to represent numbers and write expressions when solving a real-world or mathematical problem **NC.6.EE.7** Solve real-world and mathematical problems by writing and solving equations of the form: • $x + p = q$ in which p, q and x are all nonnegative rational numbers; and, • $p \cdot x = q$ for cases in which p, q and x are all nonnegative	• Apply properties of operations to calculate with positive and negative numbers in any form. • Convert between different forms of a number and equivalent forms of the expression as appropriate.	intersection satisfies both equations simultaneously. • Solve real-world and mathematical problems leading to systems of linear equations by graphing the equations. Solve simple cases by inspection.

	rational numbers **NC.6.G.3** Use the coordinate plane to solve real-world and mathematical problems by: • Drawing polygons in the coordinate plane given coordinates for the vertices. • Using coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. **NC.6.SP.3** Understand that both a measure of center and a description of variability should be considered when describing a numerical data set. a. Determine the measure of center of a data set and understand that it is a single number that summarizes all the values of that data set. • Understand that a mean is a measure of center that represents a balance point or fair share of a data set and can be influenced by the presence of extreme values within the data set. • Understand the median as a measure of center that is the numerical		

	middle of an ordered data set. b. Understand that describing the variability of a data set is needed to distinguish between data sets in the same scale, by comparing graphical representations of different data sets in the same scale that have similar measures of center, but different spreads.		
Interpret mathematical explanations by: Evaluating model and rationale for underlying relationships in selected problem-solving approach	**NC.6.RP.2** Understand that ratios can be expressed as equivalent unit ratios by finding and interpreting both unit ratios in context. **NC.6.NS.1** Use visual models and common denominators to: • Interpret and compute quotients of fractions. • Solve real-world and mathematical problems involving division of fractions. **NC.6.NS.5** Understand and use rational numbers to: • Describe quantities having opposite directions or values. • Represent quantities in real-world contexts, explaining the meaning of 0 in each situation. • Understand the absolute value	**NC.7.RP.2** Recognize and represent proportional relationships between quantities. a. Understand that a proportion is a relationship of equality between ratios. • Represent proportional relationships using tables and graphs. • Recognize whether ratios are in a proportional relationship using tables and graphs. • Compare two different proportional relationships using tables, graphs, equations, and verbal descriptions. b. Identify the unit rate (constant of proportionality)	*Note: Standard 1 applies across standards and should be integrated throughout mathematics.

	of a rational number as its distance from 0 on the number line to: ◦ Interpret absolute value as magnitude for a positive or negative quantity in a real-world context. ◦ Distinguish comparisons of absolute value from statements about order. **NC.6.NS.6** Understand rational numbers as points on the number line and as ordered pairs on a coordinate plane. a. On a number line: Recognize opposite signs of numbers as indicating locations on opposite sides of 0 and that the opposite of the opposite of a number is the number itself. • Find and position rational numbers on a horizontal or vertical number line. b. On a coordinate plane: • Understand signs of numbers in ordered pairs as indicating locations in quadrants. • Recognize that when two ordered pairs differ only by signs, the	within two quantities in a proportional relationship using tables, graphs, equations, and verbal descriptions. c. Create equations and graphs to represent proportional relationships. d. Use a graphical representation of a proportional relationship in context to: • Explain the meaning of any point (x, y). • Explain the meaning of (0, 0) and why it is included. • Understand that the y-coordinate of the ordered pair (1, r) corresponds to the unit rate and explain its meaning. **NC.7.SP.3** Recognize the role of variability when comparing two populations. a. Calculate the measure of variability of a data set and understand that it describes how the values of the data set vary with a single number. • Understand the mean absolute deviation of a data set is a measure of variability that describes	

	locations of the points are related by reflections across one or both axes. • Find and position pairs of rational numbers on a coordinate plane. **NC.6.NS.7** Understand ordering of rational numbers. a. Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. b. Write, interpret, and explain statements of order for rational numbers in real-world contexts.	the average distance that points within a data set are from the mean of the data set. • Understand that the range describes the spread of the entire data set. • Understand that the interquartile range describes the spread of the middle 50% of the data. b. Informally assess the difference between two data sets by examining the overlap and separation between the graphical representations of two data sets. **NC.7.SP.4** Use measures of center and measures of variability for numerical data from random samples to draw comparative inferences about two populations.	
ELD-MA.6-8.Explain. Expressive	**Grade 6**	**Grade 7**	**Grade 8**
Construct mathematical explanations that: Introduce concept or entity	**NC.6.EE.1** Write and evaluate numerical expressions, with and without grouping symbols, involving whole-number exponents.	**NC.7.SP.2** Generate multiple random samples (or simulated samples) of the same size to gauge the variation in estimates or predictions, and use this data to draw inferences about a	**NC.8.EE.3** Use numbers expressed in scientific notation to estimate very large or very small quantities and to express how many times as much one is than the other.

	NC.6.G.4 Represent right prisms and right pyramids using nets made up of rectangles and triangles, and use nets to find the surface area of these figures. Apply these techniques in the context of solving real world and mathematical problems.	population with an unknown characteristic of interest.	**NC.8.F.4** Analyze functions that model linear relationships. • Understand that a linear relationship can be generalized by $yy = mmmm + bb$. • Write an equation in slope-intercept form to model a linear relationship by determining the rate of change and the initial value, given at least two (x, y) values or a graph. • Construct a graph of a linear relationship given an equation in slope-intercept form. • Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of the slope and y-intercept of its graph or a table of values. **NC.8.G.6** Explain the Pythagorean Theorem and its converse.
Construct mathematical explanations that: Share solution with others	**NC.6.SP.4** Display numerical data in plots on a number line. • Use dot plots, histograms, and box plots to represent data. • Compare the attributes of different representations of the same data	*Note: Any of the problem-solving standards can be integrated with this language expectation.	**NC.8.G.3** Describe the effect of dilations about the origin, translations, rotations about the origin in 90 degree increments, and reflections across the x-axis and y- axis on two-dimensional figures using coordinates.

Construct mathematical explanations that: Describe data and/or problem-solving strategy	All SP standards except 6.SP.1 would fit here. **NC.6.NS.8** Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate. **NC.6.NS.9** Apply and extend previous understandings of addition and subtraction. • Describe situations in which opposite quantities combine to make 0. • Understand $p + q$ as the number located a distance q from p, in the positive or negative direction depending on the sign of q. Show that a number and its additive inverse create a zero pair. • Understand subtraction of integers as adding the additive inverse, $p - q = p + (-q)$. Show that the distance between two integers on the number line is the absolute value of their difference. • Use models to add and subtract integers from -20 to 20 and	All SP standards except 7.SP.1 would fit here. **NC.7.RP.1** Compute unit rates associated with ratios of fractions to solve real-world and mathematical problems. **NC.7.NS.3** Solve real-world and mathematical problems involving numerical expressions with rational numbers using the four operations. **NC.7.EE.3** Solve multi-step real-world and mathematical problems posed with rational numbers in algebraic expressions. • Apply properties of operations to calculate with positive and negative numbers in any form. • Convert between different forms of a number and equivalent forms of the expression as appropriate**.** **NC.7.EE.4** Use variables to represent quantities to solve real-world or mathematical problems. a. Construct equations to solve problems by reasoning about the quantities. • Fluently solve multistep equations with the variable on one side,	**NC.8.EE.2** Use square root and cube root symbols to: • • Represent solutions to equations of the form x2 = p and x3 = p, where p is a positive rational number. • • Evaluate square roots of perfect squares and cube roots of perfect cubes for positive numbers less than or equal to 400. **NC.8.EE.4** Perform multiplication and division with numbers expressed in scientific notation to solve real-world problems, including problems where both decimal and scientific notation are used. **NC.8.EE.7** Solve real-world and mathematical problems by writing and solving equations and inequalities in one variable. • Recognize linear equations in one variable as having one solution, infinitely many solutions, or no solutions. • Solve linear equations and inequalities including multi-step equations and inequalities with the same variable on both sides. **NC.8.EE.8** Analyze and solve a

	describe real-world contexts using sums and differences. **NC.6.EE.2 Write, read, and evaluate algebraic expressions.** • Write expressions that record operations with numbers and with letters standing for numbers. • Identify parts of an expression using mathematical terms and view one or more of those parts as a single entity. • Evaluate expressions at specific values of their variables using expressions that arise from formulas used in real-world problems. **NC.6.G.1** Create geometric models to solve real-world and mathematical problems to: • Find the area of triangles by composing into rectangles and decomposing into right triangles. • Find the area of special quadrilaterals and polygons by decomposing into triangles or rectangles. **NC.6.G.2** Apply and extend previous understandings of the volume of a right rectangular prism to find the volume of	including those generated by word problems. • Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. • Interpret the solution in context. b. Construct inequalities to solve problems by reasoning about the quantities. • Fluently solve multi-step inequalities with the variable on one side, including those generated by word problems. • Compare an algebraic solution process for equations and an algebraic solution process for inequalities. • Graph the solution set of the inequality and interpret in context. **NC.7.G.1** Solve problems involving scale drawings of geometric figures by: • Building an understanding that angle measures remain the same and side lengths are	system of two linear equations in two variables in slope-intercept form. • Understand that solutions to a system of two linear equations correspond to the points of intersection of their graphs because the point of intersection satisfies both equations simultaneously. • Solve real-world and mathematical problems leading to systems of linear equations by graphing the equations. Solve simple cases by inspection. **NC.8.G.3** Describe the effect of dilations about the origin, translations, rotations about the origin in 90 degree increments, and reflections across the x-axis and y- axis on two-dimensional figures using coordinates. **NC.8.G.4** Use transformations to define similarity. • Verify experimentally the properties of dilations that create similar figures. • Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and

	right rectangular prisms with fractional edge lengths. Apply this understanding to the context of solving real-world and mathematical problems. **NC.6.SP.5** Summarize numerical data sets in relation to their context. a. Describe the collected data by: • Reporting the number of observations in dot plots and histograms. • Communicating the nature of the attribute under investigation, how it was measured, and the units of measurement. b. Analyze center and variability by: • Giving quantitative measures of center, describing variability, and any overall pattern, and noting any striking deviations. • Justifying the appropriate choice of measures of center using the shape of the data distribution.	proportional. • Using a scale factor to compute actual lengths and areas from a scale drawing. • Creating a scale drawing. **NC.7.G.5** Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve equations for an unknown angle in a figure. **NC.7.G.6** Solve real-world and mathematical problems involving: • Area and perimeter of two-dimensional objects composed of triangles, quadrilaterals, and polygons. • Volume and surface area of pyramids, prisms, or three-dimensional objects composed of cubes, pyramids, and right prisms **NC.7.SP.6** Collect data to calculate the experimental probability of a chance event, observing its long-run relative frequency. Use this experimental probability to predict the approximate relative frequency.	dilations. • Given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them. **NC.8.G.7** Apply the Pythagorean Theorem and its converse to solve real-world and mathematical problems. **NC.8.G.8** Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.
Construct mathematical explanations that: State	**NC.6.NS.7** Understand ordering of rational numbers.	*Note: Any of the problem-solving standards can be integrated with this	*Note: Any of the problem-solving standards can be integrated with this

reasoning used to generate solution	a. Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. b. Write, interpret, and explain statements of order for rational numbers in real-world contexts. **NC.6.G.4** Represent right prisms and right pyramids using nets made up of rectangles and triangles, and use nets to find the surface area of these figures. Apply these techniques in the context of solving real world and mathematical problems.	language expectation.	language expectation. **NC.8.SP.1** Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Investigate and describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association. **NC.8.SP.2** Model the relationship between bivariate quantitative data to: • Informally fit a straight line for a scatter plot that suggests a linear association. • Informally assess the model fit by judging the closeness of the data points to the line.
ELD-MA.6-8.Argue. Interpretive	**Grade 6**	**Grade 7**	**Grade 8**
Interpret mathematics arguments by: Comparing conjectures with previously established results	*Note: Standard 1 applies across standards and should be integrated throughout mathematics.	**NC.7.SP.3 Recognize the role of variability when comparing two populations.** a. Calculate the measure of variability of a data set and understand that it describes how the values of the data set vary with a single number. • Understand the mean absolute deviation of a data set is a measure of	**NC.8.G.4** Use transformations to define similarity. • Verify experimentally the properties of dilations that create similar figures. • Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and

		variability that describes the average distance that points within a data set are from the mean of the data set. • Understand that the range describes the spread of the entire data set. • Understand that the interquartile range describes the spread of the middle 50% of the data. b. Informally assess the difference between two data sets by examining the overlap and separation between the graphical representations of two data sets **NC.7.SP.4** Use measures of center and measures of variability for numerical data from random samples to draw comparative inferences about two populations.	dilations. • Given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them **NC.8.SP.4** Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two way table. • Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. • Use relative frequencies calculated for rows or columns to describe possible association between the two variables.
Interpret mathematics arguments by: Distinguishing commonalities among strategies used	*Note: Any of the problem-solving standards can be integrated with this language expectation. **NC.6.RP.3** Use ratio reasoning with equivalent whole-number ratios to solve real-world and mathematical	*Note: Any of the problem-solving standards can be integrated with this language expectation. **NC.7.EE.2** Understand that equivalent expressions can reveal real-world and mathematical relationships. Interpret	*Note: Any of the problem-solving standards can be integrated with this language expectation. **NC.8.F.2** Compare properties of two linear functions each represented in a different way (algebraically, graphically,

	problems by: • Creating and using a table to compare ratios. • Finding missing values in the tables. • Using a unit ratio. • Converting and manipulating measurements using given ratios. • Plotting the pairs of values on the coordinate plane.	the meaning of the parts of each expression in context. **NC.7.RP.3** Use scale factors and unit rates in proportional relationships to solve ratio and percent problems.	numerically in tables, or by verbal descriptions). **NC.8.SP.4** Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two way table. • Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. • Use relative frequencies calculated for rows or columns to describe possible association between the two variables.
Interpret mathematics arguments by: Evaluating relationships between evidence and mathematical facts to create generalizations	**NC.6.SP.1** Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. **NC.6.SP.2** Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.	**NC.7.SP.1** Understand that statistics can be used to gain information about a population by: • Recognizing that generalizations about a population from a sample are valid only if the sample is representative of that population. • Using random sampling to produce representative samples to support valid inferences	**NC.8.F.5** Qualitatively analyze the functional relationship between two quantities. • Analyze a graph determining where the function is increasing or decreasing; linear or non-linear. • Sketch a graph that exhibits the qualitative features of a real-world function. **NC.8.SP.1** Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Investigate and describe patterns such

			as clustering, outliers, positive or negative association, linear association, and nonlinear association.
ELD-MA.6-8.Argue. Expressive	**Grade 6**	**Grade 7**	**Grade 8**
Construct mathematics arguments that: Create conjecture, using definitions and previously established results	**NC.6.EE.3** Apply the properties of operations to generate equivalent expressions without exponents. **NC.6.G.2** Apply and extend previous understandings of the volume of a right rectangular prism to find the volume of right rectangular prisms with fractional edge lengths. Apply this understanding to the context of solving real-world and mathematical problems.	**NC.7.NS.1** Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers, using the properties of operations, and describing real-world contexts using sums and differences. **NC.7.NS.2** Apply and extend previous understandings of multiplication and division. a. Understand that a rational number is any number that can be written as a quotient of integers with a non-zero divisor. b. Apply properties of operations as strategies, including the standard algorithms, to multiply and divide rational numbers and describe the product and quotient in real-world contexts. c. Use division and previous understandings of fractions and decimals. • Convert a fraction to a decimal using long division.	**NC.8.F.3** Identify linear functions from tables, equations, and graphs. **NC.8.G.9** Understand how the formulas for the volumes of cones, cylinders, and spheres are related and use the relationship to solve real-world and mathematical problems.

		• Understand that the decimal form of a rational number terminates in 0s or eventually repeats. **NC.7.SP.7** Develop a probability model and use it to find probabilities of simple events. a. Develop a uniform probability model by assigning equal probability to all outcomes and use the model to determine probabilities of events. b. Develop a probability model (which may not be uniform) by repeatedly performing a chance process and observing frequencies in the data generated. c. Compare theoretical and experimental probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy. **NC.7.SP.8** Determine probabilities of compound events using organized lists, tables, tree diagrams, and simulation. a. Understand that, just as with simple events, the probability of	

		a compound event is the fraction of outcomes in the sample space for which the compound event occurs. b. For an event described in everyday language, identify the outcomes in the sample space which compose the event, when the sample space is represented using organized lists, tables, and tree diagrams. c. Design and use a simulation to generate frequencies for compound events **NC.7.G.6** Solve real-world and mathematical problems involving: • Area and perimeter of two-dimensional objects composed of triangles, quadrilaterals, and polygons. • Volume and surface area of pyramids, prisms, or three-dimensional objects composed of cubes, pyramids, and right prisms.	
Construct mathematics arguments that: Generalize logic across cases	**NC.6.EE.5** Use substitution to determine whether a given number in a specified set makes an equation true.	**NC.7.G.6** Solve real-world and mathematical problems involving: • Area and perimeter of two-dimensional objects composed of triangles,	**NC.8.F.5** Qualitatively analyze the functional relationship between two quantities. • Analyze a graph determining where the function is increasing

		quadrilaterals, and polygons. • Volume and surface area of pyramids, prisms, or three-dimensional objects composed of cubes, pyramids, and right prisms. **NC.7.EE.4** Use variables to represent quantities to solve real-world or mathematical problems. a. Construct equations to solve problems by reasoning about the quantities. • Fluently solve multistep equations with the variable on one side, including those generated by word problems. • Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. • Interpret the solution in context. b. Construct inequalities to solve problems by reasoning about the quantities. • Fluently solve multi-step inequalities with the variable on one side, including those	or decreasing; linear or non-linear. • Sketch a graph that exhibits the qualitative features of a real-world function. **NC.8.G.5** Use informal arguments to analyze angle relationships. • Recognize relationships between interior and exterior angles of a triangle. • Recognize the relationships between the angles created when parallel lines are cut by a transversal. • Recognize the angle-angle criterion for similarity of triangles. • Solve real-world and mathematical problems involving angles

		generated by word problems. • Compare an algebraic solution process for equations and an algebraic solution process for inequalities. • Graph the solution set of the inequality and interpret in context.	
Construct mathematics arguments that: Justify conclusions with evidence and mathematical facts	**NC.6.EE.4** Identify when two expressions are equivalent and justify with mathematical reasoning. **NC.6.SP.5** Summarize numerical data sets in relation to their context. a. Describe the collected data by: • Reporting the number of observations in dot plots and histograms. • Communicating the nature of the attribute under investigation, how it was measured, and the units of measurement. b. Analyze center and variability by: • Giving quantitative measures of center, describing variability, and any overall pattern,	*Note: Standard 1 applies across standards and should be integrated throughout mathematics.	**NC.8.SP.2** Model the relationship between bivariate quantitative data to: • Informally fit a straight line for a scatter plot that suggests a linear association. • Informally assess the model fit by judging the closeness of the data points to the line.

	and noting any striking deviations. • Justifying the appropriate choice of measures of center using the shape of the data distribution.		
Construct mathematics arguments that: Evaluate and critique others' arguments	*Note: Any of the problem-solving standards can be integrated with this language expectation.	*Note: Any of the problem-solving standards can be integrated with this language expectation.	*Note: Any of the problem-solving standards can be integrated with this language expectation.

ELD Standard 3: Language for Mathematics
Grades 9-12

ELD-MA.9-12.Explain. Interpretive	Math 1	Math 2	Math 3
Interpret mathematical explanations by: Analyzing data and owning problem-solving approaches	**NC.M1.A-REI.1** Justify a chosen solution method and each step of the solving process for linear and quadratic equations using mathematical reasoning. **NC.M1.F-IF.8a** Use equivalent expressions to reveal and explain different properties of a function. a. Rewrite a quadratic function to reveal and explain different key features of the function **NC.M1.F-IF.8b** Use equivalent expressions to reveal and explain different properties of a function. b. Interpret and explain growth and decay rates for an exponential function **NC.M1.S-ID.6a** Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. a. Fit a least squares regression line to linear data using technology. Use the fitted function to solve problems.	**NC.M2.A-REI.1** Justify a chosen solution method and each step of the solving process for quadratic, square root and inverse variation equations using mathematical reasoning. **NC.M2.S-CP.3a** Develop and understand independence and conditional probability. a. Use a 2-way table to develop understanding of the conditional probability of A given B (written P(A|B)) as the likelihood that A will occur given that B has occurred. That is, P(A|B) is the fraction of event B's outcomes that also belong to event A. **NC.M2.S-CP.3b** Develop and understand independence and conditional probability. b. Understand that event A is independent from event B if the probability of event A does not change in response to the occurrence of event B. That is P(A|B) = P(A).	**NC.M3.A-SSE.2** Use the structure of an expression to identify ways to write equivalent expressions. **NC.M3.A-SSE.3** Write an equivalent form of an exponential expression by using the properties of exponents to transform expressions to reveal rates based on different intervals of the domain. **NC.M3.A-APR.2** Understand and apply the Remainder Theorem. **NC.M3.A-APR.3** Understand the relationship among factors of a polynomial expression, the solutions of a polynomial equation and the zeros of a polynomial function. **NC.M3.A-REI.2** Solve and interpret one variable rational equations arising from a context, and explain how extraneous solutions may be produced. **NC.M3.A-REI.11** Extend an understanding that the xx-coordinates

	NC.M1.S-ID.6b Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. b. Assess the fit of a linear function by analyzing residuals. **NC.M1.S-ID.6c** Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. c. Fit a function to exponential data using technology. Use the fitted function to solve problems **NC.M1.S-ID.8** Using technology, determine the correlation coefficient of bivariate data and interpret it as a measure of the strength and direction of a linear relationship. Use a scatter plot, correlation coefficient, and a residual plot to determine the appropriateness of using a linear function to model a relationship between two variables.	**NC.M2.S-CP.4** Represent data on two categorical variables by constructing a two-way frequency table of data. Interpret the two-way table as a sample space to calculate conditional, joint and marginal probabilities. Use the table to decide if events are independent.	of the points where the graphs of two equations yy = $ff(xx)$ and yy = $gg(xx)$ intersect are the solutions of the equation $ff(xx)$ = $gg(xx)$ and approximate solutions using a graphing technology or successive approximations with a table of values. **NC.M3.F-IF.7** Analyze piecewise, absolute value, polynomials, exponential, rational, and trigonometric functions (sine and cosine) using different representations to show key features of the graph, by hand in simple cases and using technology for more complicated cases, including: domain and range; intercepts; intervals where the function is increasing, decreasing, positive, or negative; rate of change; relative maximums and minimums; symmetries; end behavior; period; and discontinuities. **NC.M3.F-BF.4b** Find an inverse function. b. Determine if an inverse function exists by analyzing tables, graphs, and equations. **NC.M3.F-BF.4c** Find an inverse function. c. If an inverse function exists for a linear, quadratic and/or

			exponential function, ff, represent the inverse function, $ff-1$, with a table, graph, or equation and use it to solve problems in terms of a context.
Interpret mathematical explanations by: Evaluating rationales, models, and/or interpretations based on evidence and mathematical principles	**NC.M1.A-SSE.1a** Interpret expressions that represent a quantity in terms of its context**.** a. Identify and interpret parts of a linear, exponential, or quadratic expression, including terms, factors, coefficients, and exponents. **NC.M1.F-LE.5** Interpret expressions for functions in terms of the situation they model. Interpret the parameters a and b in a linear function $f(x) = ax + b$ or an exponential function $g(x) = ab^x$ in terms of a context **NC.M1.S-ID.7** Use the linear model to interpolate and extrapolate predicted values. Assess the validity of a predicted value. **NC.M1.F-IF.6** Calculate and interpret the average rate of change over a specified interval for a function presented numerically, graphically, and/or symbolically. **NC.M1.S-ID.9** Distinguish between	**NC.M2.A-SSE.1a** Interpret expressions that represent a quantity in terms of its context**.** a. Identify and interpret parts of a quadratic, square root, inverse variation, or right triangle trigonometric expression, including terms, factors, coefficients, radicands, and exponents. **NC.M2.A-SSE.1b** Interpret expressions that represent a quantity in terms of its context. b. Interpret quadratic and square root expressions made of multiple parts as a combination of single entities to give meaning in terms of a context. **NC.M2.A-REI.7** Use tables, graphs, and algebraic methods to approximate or find exact solutions of systems of linear and quadratic equations, and interpret the solutions in terms of a context.	**NC.M3.A-SSE.1a** Interpret expressions that represent a quantity in terms of its context. a. Identify and interpret parts of piecewise, absolute value, polynomial, exponential and rational expressions including terms, factors, coefficients, and exponents. **NC.M3.A-SSE.1b** Interpret expressions that represent a quantity in terms of its context. b. Interpret expressions composed of multiple parts by viewing one or more of their parts as a single entity to give meaning in terms of a context. **NC.M3.A-APR.6** Rewrite simple rational expressions in different forms; write $aa(xx)$ $bb(xx)$ in the form $qq(xx)$ + $rr(xx)$ $bb(xx)$, where $aa(xx)$, $bb(xx)$, $qq(xx)$, and $rr(xx)$ are polynomials with the degree of $rr(xx)$ less than the degree of $bb(xx)$. **NC.M3.F-IF.2** Use function notation to

	association and causation	**NC.M2.F-IF.4** Interpret key features of graphs, tables, and verbal descriptions in context to describe functions that arise in applications relating two quantities, including: domain and range, rate of change, symmetries, and end behavior. **NC.M2.F-BF.3** Understand the effects of the graphical and tabular representations of a linear, quadratic, square root, and inverse variation function f with $k \cdot f(x)$, $f(x) + k$, $f(x + k)$ for specific values of k (both positive and negative). **NC.M2.G-SRT.2** Understand similarity in terms of transformations. a. Determine whether two figures are similar by specifying a sequence of transformations that will transform one figure into the other. b. Use the properties of dilations to show that two triangles are similar when all corresponding pairs of sides are proportional and all corresponding pairs of angles are congruent **NC.M2.G-SRT.3** Understand similarity in terms of transformations. Use	evaluate piecewise defined functions for inputs in their domains, and interpret statements that use function notation in terms of a context. **NC.M3.F-IF.4** Interpret key features of graphs, tables, and verbal descriptions in context to describe functions that arise in applications relating two quantities to include periodicity and discontinuities. **NC.M3.F-BF.3** Extend an understanding of the effects on the graphical and tabular representations of a function when replacing $ff(xx)$ with $kk \cdot ff(xx)$, $ff(xx) + kk$, $ff(xx + kk)$ to include $ff(kk \cdot xx)$ for specific values of kk (both positive and negative). **NC.M3.F-BF.4a** Find an inverse function. a. Understand the inverse relationship between exponential and logarithmic, quadratic and square root, and linear to linear functions and use this relationship to solve problems using tables, graphs, and equations. **NC.M3.F-TF.1** Understand radian measure of an angle as:

		transformations (rigid motions and dilations) to justify the AA criterion for triangle similarity.	• The ratio of the length of an arc on a circle subtended by the angle to its radius. • A dimensionless measure of length defined by the quotient of arc length and radius that is a real number. • The domain for trigonometric functions. **NC.M3.G-C.2** Understand and apply theorems about circles. • Understand and apply theorems about relationships with angles and circles, including central, inscribed and circumscribed angles. • Understand and apply theorems about relationships with line segments and circles including, radii, diameter, secants, tangents and chords. **NC.M3.S-IC.6** Evaluate articles and websites that report data by identifying the source of the data, the design of the study, and the way the data are graphically displayed.
ELD-MA.9-12.Explain. Interpretive	**Math 4**	**Discrete Math for Computer Science**	**Precalculus**
Interpret mathematical explanations by: Analyzing	**NC.M4.SP.1.2** Design sample surveys and comparative experiments using	**DCS.N.2.1** Organize data into matrices to solve problems.	**PC.F.1.4** Implement graphical and algebraic methods to solve

data and owning problem-solving approaches	sampling methods to collect and analyze data to answer a statistical question. **NC.M4.SP.1.3** Organize large datasets of real-world contexts (i.e. datasets that include 3 or more measures and have sample sizes >200) using technology (e.g., spreadsheets, dynamic data analysis tools) to determine: types of variables in the data set, possible outcomes for each variable, statistical questions that could be asked of the data, and types of numerical and graphical summaries could be used to make sense of the data.	**DCS.N.2.3** Represent a system of equations as a matrix equation. **DCS.N.2.4** Use inverse matrices to solve a system of equations with technology. **DCS.GT.2.1** Implement critical path analysis algorithms to determine the minimum project time. **DCS.GT.2.2** Implement the brute force method, the nearest-neighbor algorithm, and the cheapest-link algorithm to find solutions to a Traveling Salesperson Problem. **DCS.GT.2.4** Implement Kruskal and Prim's algorithms to determine the weight of the minimum spanning tree of a connected graph.	trigonometric equations and inequalities in context with support from technology.
Interpret mathematical explanations by: Evaluating rationales, models, and/or interpretations based on evidence and mathematical principles	**NC.M4.AF.2.3** Interpret key features (amplitude, period, phase shift, vertical shifts, midline, domain, range) of models using sine and cosine functions in terms of a context. **NC.M4.SP.1.4** Interpret non-standard data visualizations from the media or scientific papers to make sense of real-world phenomena.	**DCS.N.3.4** Interpret Venn diagrams to solve problems. **DCS.F.1.5** Interpret the solutions to arithmetic and geometric sequences and series problems, in context. **DCS.GT.1.3** Interpret a complete digraph to determine rank. **DCS.GT.2.1** Implement critical path	**PC.F.4.2** Integrate information to build exponential functions to model phenomena involving growth or decay.

		analysis algorithms to determine the minimum project time.	
ELD-MA.9-12.Explain. Expressive	**Math 1**	**Math 2**	**Math 3**
Construct mathematical explanations that: Introduce mathematical concept or entity	**NC.M1.F-LE.1** Identify situations that can be modeled with linear and exponential functions, and justify the most appropriate model for a situation based on the rate of change over equal intervals. **NC.M1.F-LE.3** Compare the end behavior of linear, exponential, and quadratic functions using graphs and tables to show that a quantity increasing exponentially eventually exceeds a quantity increasing linearly or quadratically. **NC.M1.S-ID.2** Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. Interpret differences in shape, center, and spread in the context of the data sets.	**NC.M2.N-RN.1** Explain how expressions with rational exponents can be rewritten as radical expressions. **NC.M2.N-CN.1** Know there is a complex number i such that $i^2 = -1$, and every complex number has the form $a + bi$ where a and b are real numbers. **NC.M2.F-IF.8** Use equivalent expressions to reveal and explain different properties of a function by developing and using the process of completing the square to identify the zeros, extreme values, and symmetry in graphs and tables representing quadratic functions, and interpret these in terms of a context.	*Note: Standard 1 applies across standards and should be integrated throughout mathematics.
Construct mathematical explanations that: Share solutions with others	*Note: Any of the problem-solving standards can be integrated with this language expectation.	*Note: Any of the problem-solving standards can be integrated with this language expectation.	*Note: Any of the problem-solving standards can be integrated with this language expectation.

	NC.M1.A-APR.1 Perform arithmetic operations on polynomials. Build an understanding that operations with polynomials are comparable to operations with integers by adding and subtracting quadratic expressions and by adding, subtracting, and multiplying linear expressions. **NC.M1.A-CED.2.** Create and graph equations in two variables to represent linear, exponential, and quadratic relationships between quantities**.** **NC.M1.S-ID.1** Use technology to represent data with plots on the real number line (histograms and box plots).	**NC.M2.S-CP.5** Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations.	
Construct mathematical explanations that: Describe data and/or approach used to solve a problem	**NC.M1.A-SSE.3** Write an equivalent form of a quadratic expression $ax^2 + bx + c$, where a is an integer, by factoring to reveal the solutions of the equation or the zeros of the function the expression defines. **NC.M1.A-CED.1** Create equations and inequalities in one variable that represent linear, exponential, and quadratic relationships and use them to solve problems. **NC.M1.A-CED.3** Create systems of	*Note: Any of the problem-solving standards can be integrated with this language expectation. **NC.M2.A-CED.1** Create equations and inequalities in one variable that represent quadratic, square root, inverse variation, and right triangle trigonometric relationships and use them to solve problems. **NC.M2.A-CED.2** Create and graph equations in two variables to represent quadratic, square root and inverse variation relationships between	**NC.M3.N-CN.9** Use the Fundamental Theorem of Algebra to determine the number and potential types of solutions for polynomial functions. **NC.M3.A-CED.1** Create equations and inequalities in one variable that represent absolute value, polynomial, exponential, and rational relationships and use them to solve problems algebraically and graphically. **NC.M3.A-CED.2** Create and graph equations in two variables to represent absolute value, polynomial,

	linear equations and inequalities to model situations in context. **NC.M1.A-CED.4** Solve for a quantity of interest in formulas used in science and mathematics using the same reasoning as in solving equations. **NC.M1.A-REI.3** Solve linear equations and inequalities in one variable. **NC.M1.A-REI.4** Solve for the real solutions of quadratic equations in one variable by taking square roots and factoring. **NC.M1.A-REI.5** Explain why replacing one equation in a system of linear equations by the sum of that equation and a multiple of the other produces a system with the same solutions. **NC.M1.A-REI.6** Use tables, graphs, or algebraic methods (substitution and elimination) to find approximate or exact solutions to systems of linear equations and interpret solutions in terms of a context. **NC.M1.A-REI.10** Understand that the graph of a two-variable equation represents the set of all solutions to the equation.	quantities. **NC.M2.F-BF.1** Write a function that describes a relationship between two quantities by building quadratic functions with real solution(s) and inverse variation functions given a graph, a description of a relationship, or ordered pairs (include reading these from a table). **NC.M2.G-CO.2** Experiment with transformations in the plane. • Represent transformations in the plane. • Compare rigid motions that preserve distance and angle measure (translations, reflections, rotations) to transformations that do not preserve both distance and angle measure (e.g. stretches, dilations). • Understand that rigid motions produce congruent figures while dilations produce similar figures. **NC.M2.G-CO.3** Given a triangle, quadrilateral, or regular polygon, describe any reflection or rotation symmetry i.e., actions that carry the figure onto itself. Identify center and angle(s) of rotation symmetry. Identify	exponential and rational relationships between quantities. **NC.M3.F-BF.1a.** Write a function that describes a relationship between two quantities. a. Build polynomial and exponential functions with real solution(s) given a graph, a description of a relationship, or ordered pairs (include reading these from a table). **NC.M3.F-BF.1b** Write a function that describes a relationship between two quantities. b. Build a new function, in terms of a context, by combining standard function types using arithmetic operations. **NC.M3.F-LE.4** Use logarithms to express the solution to $aabbcccc = dd$ where aa, bb, cc, and dd are numbers and evaluate the logarithm using technology. **NC.M3.F-TF.5** Use technology to investigate the parameters, aa, bb, and h of a sine function, $ff(xx) = aa \cdot ssssss(bb \cdot xx) + h$, to represent periodic phenomena and interpret key features in terms of a context.

	NC.M1.A-REI.12 Represent the solutions of a linear inequality or a system of linear inequalities graphically as a region of the plane. **NC.M1.S-ID.3** Examine the effects of extreme data points (outliers) on shape, center, and/or spread. **NC.M1.F-LE.1** Identify situations that can be modeled with linear and exponential functions, and justify the most appropriate model for a situation based on the rate of change over equal intervals.	line(s) of reflection symmetry. Represent transformations in the plane. **NC.M2.G-SRT.4** Use similarity to solve problems and to prove theorems about triangles. Use theorems about triangles to prove relationships in geometric figures. • A line parallel to one side of a triangle divides the other two sides proportionally and its converse. • The Pythagorean Theorem **NC.M2.G-SRT.8** Use trigonometric ratios and the Pythagorean Theorem to solve problems involving right triangles in terms of a context. **NC.M2.G-SRT.12** Develop properties of special right triangles (45-45-90 and 30-60-90) and use them to solve problems. **NC.M2.S-IC.2** Use simulation to determine whether the experimental probability generated by sample data is consistent with the theoretical probability based on known information about the population. **NC.M2.S-CP.1** Describe events as subsets of the outcomes in a sample space using characteristics of the	**NC.M3.G-CO.14** Apply properties, definitions, and theorems of two-dimensional figures to prove geometric theorems and solve problems. **NC.M3.G-C.5** Using similarity, demonstrate that the length of an arc, s, for a given central angle is proportional to the radius, r, of the circle. Define radian measure of the central angle as the ratio of the length of the arc to the radius of the circle, s/r. Find arc lengths and areas of sectors of circles. **NC.M3.G-GPE.1** Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation **NC.M3.G-GMD.3** Use the volume formulas for prisms, cylinders, pyramids, cones, and spheres to solve problems. **NC.M3.G-GMD.4** Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of

		outcomes or as unions, intersections and complements of other events. **NC.M2.S-CP.5** Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. **NC.M2.S-CP.6** Find the conditional probability of A given B as the fraction of B's outcomes that also belong to A, and interpret the answer in context. **NC.M2.S-CP.7** Apply the Addition Rule, P(A or B) = P(A) + P(B) – P(A and B), and interpret the answer in context. **NC.M2.S-CP.8** Apply the general Multiplication Rule P (A and B) = P(A)P(B|A) = P(B)P(A|B), and interpret the answer in context. Include the case where A and B are independent: P (A and B) = P(A) P(B).	two-dimensional objects. **NC.M3.G-MG.1** Apply geometric concepts in modeling situations • Use geometric and algebraic concepts to solve problems in modeling situations: • Use geometric shapes, their measures, and their properties, to model real-life objects. • Use geometric formulas and algebraic functions to model relationships. • Apply concepts of density based on area and volume. • Apply geometric concepts to solve design and optimization problems.
Construct mathematical explanations that: State reasoning used to generate own or alternate solutions	**NC.M1.A-CED.1** Create equations and inequalities in one variable that represent linear, exponential, and quadratic relationships and use them to solve problems. **NC.M1.A-CED.2** Create and graph equations in two variables to represent	**NC.M2.N-RN.3** Use the properties of rational and irrational numbers to explain why: • the sum or product of two rational numbers is rational; • the sum of a rational number and an irrational number is irrational;	*Note: Standard 1 applies across standards and should be integrated throughout mathematics.

	linear, exponential, and quadratic relationships between quantities. **NC.M1.S-ID.1** Use technology to represent data with plots on the real number line (histograms and box plots).	• the product of a nonzero rational number and an irrational number is irrational. **NC.M2.A-REI.2** Solve and interpret one variable inverse variation and square root equations arising from a context, and explain how extraneous solutions may be produced. **NC.M2.A-REI.4a** Solve for all solutions of quadratic equations in one variable. a. Understand that the quadratic formula is the generalization of solving $ax^2 + bx + c$ by using the process of completing the square. **NC.M2.A-REI.4b** Solve for all solutions of quadratic equations in one variable. b. Explain when quadratic equations will have non-real solutions and express complex solutions as $a \pm bi$ for real numbers a and b. **NC.M2.A-REI.7** Use tables, graphs, and algebraic methods to approximate or find exact solutions of systems of linear and quadratic equations, and interpret the solutions in terms of a context.	
ELD-MA.9-12.Explain. Expressive	**Math 4**	**Discrete Math**	**Precalculus**

Construct mathematical explanations that: Introduce mathematical concept or entity	**NC.M4.N.1.1** Execute procedures to add and subtract complex numbers. **NC.M4.N.1.2** Execute procedures to multiply complex numbers. **NC.M4.N.2.1** Execute procedures of addition, subtraction, multiplication, and scalar multiplication on matrices. **NC.M4.N.2.2** Execute procedures of addition, subtraction, and scalar multiplication on vectors. **NC.M4.AF.1.1** Execute algebraic procedures to compose two functions. **NC.M4.AF.1.2** Execute a procedure to determine the value of a composite function at a given value when the functions are in algebraic, graphical, or tabular representations. **NC.M4.SP.3.2** Implement the binomial distribution to model situations and make decisions. **NC.M4.SP.3.4** Implement the normal distribution as a probability distribution to determine the likelihood of events occurring.	**DCS.N.1.1** Implement procedures of addition, subtraction, multiplication, and scalar multiplication on matrices. **DCS.N.1.2** Implement procedures of addition, subtraction, and scalar multiplication on vectors. **DCS.N.1.3** Implement procedures to find the inverse of a matrix. **DCS.N.3.3** Represent properties and relationships among sets using Venn diagrams. **DCS.N.4.1** Use the Euclidean Algorithm to determine the greatest common factor and least common multiple. **DCS.SP.1.2** Implement procedures to calculate a permutation or combination. **PC.F.1.3** Integrate information to build trigonometric functions with specified amplitude, frequency, period, phase shift, or midline with or without context.	**PC.F.4.7** Construct graphs of transformations of power, exponential, and logarithmic functions showing key features. **PC.F.4.8** Identify the conic section (ellipse, hyperbola, parabola) from its algebraic representation in standard form.
Construct mathematical explanations that: Share	*Note: Any of the standards can be integrated with this language	**DCS.GT.1.1** Represent real world situations using a vertex-edge graph,	**PC.F.2.2** Explain the relationship between the symmetry of a unit circle

solutions with others	expectation. **NC.M4.AF.3.2** Implement properties of logarithms to solve equations in contextual situations.	adjacency matrix, and vertex-edge table.	and the periodicity of trigonometric functions.
Construct mathematical explanations that: Describe data and/or approach used to solve a problem	**NC.M4.AF.2.1** Translate trigonometric expressions using the reciprocal and Pythagorean identities**.** **NC.M4.AF.2.2** Implement the Law of Sines and the Law of Cosines to solve problems. **NC.M4.AF.3.1** Execute properties of logarithms to rewrite expressions and solve equations algebraically. **NC.M4.AF.3.2** Implement properties of logarithms to solve equations in contextual situations. **NC.M4.AF.4.1** Translate between algebraic and graphical representations of piecewise functions (linear, exponential, quadratic, polynomial, square root). **NC.M4.AF.4.2** Construct piecewise functions to model a contextual situation. **NC.M4.AF.5.1** Construct regression models of linear, quadratic,	**DCS.N.3.2** Implement set operations to find unions, intersections, complements and set differences with multiple sets. **DCS.N.4.2** Use the Fundamental Theorem of Arithmetic to solve problems. **DCS.F.1.1** Implement procedures to find the nth term in an arithmetic or geometric sequence using spreadsheets**.** **DCS.F.1.2** Represent the sum of a sequence using sigma notation. **DCS.F.1.4** Implement procedures to find the sum of an infinite sequence and determine if the series converges or diverges. **DCS.SP.1.2** Implement procedures to calculate a permutation or combination. **DCS.L.1.1** Construct truth tables that encode the truth and falsity of two or more statements.	**PC.N.3.1** Represent a vector indicating magnitude and direction. **PC.N.3.2** Execute sum and difference algorithms to combine vectors. **PC.A.1.1** Implement algebraic (sign analysis) methods to solve rational and polynomial inequalities **PC.A.1.2** Implement graphical methods to solve rational and polynomial inequalities. **PC.A.2.2** Implement properties of exponentials and logarithms to solve equations**.** **PC.F.3.3** Implement the Pythagorean identity to find sin(θ), cos(θ), or tan(θ) given sin(θ), cos(θ), or tan(θ) and the quadrant of the angle**.** **PC.F.4.4** Implement graphical and algebraic methods to solve exponential and logarithmic equations in context with support from technology.

	exponential, logarithmic, & sinusoidal functions of bivariate data using technology to model data and solve problems. **NC.M4.SP.1.2** Design sample surveys and comparative experiments using sampling methods to collect and analyze data to answer a statistical question. **NC.M4.SP.2.3** Implement a one proportion z-test to determine if an observed proportion is significantly different from a hypothesized proportion. **NC.M4.SP.3.1** Implement discrete probability distributions to model random phenomena and make decisions (e.g., expected value of playing a game, etc.). **NC.M4.SP.3.2** Implement the binomial distribution to model situations and make decisions. **NC.M4.SP.3.4** Implement the normal distribution as a probability distribution to determine the likelihood of events occurring.		**PC.F.4.6** Implement graphical and algebraic methods to solve optimization problems given rational and polynomial functions in context with support from technology. **PC.F.5.2** Execute a procedure to determine the value of a composite function at a given value using algebraic, graphical, and tabular representations. **PC.F.5.3** Implement algebraic methods to find the domain of a composite function. **PC.F.5.4** Organize information to build models involving function composition **PC.F.5.5** Deconstruct a composite function into two functions. **PC.F.5.6** Implement algebraic and graphical methods to find an inverse function of an existing function, restricting domains if necessary. **PC.F.7.2** Implement technology to solve contextual problems involving parametric equations.
Construct mathematical explanations that: State	**NC.M4.SP.2.1** Design a simulation to make a sampling distribution that can	**DCS.N.4.3** Conclude that sets are equal using the properties of set	*Note: Standard 1 applies across standards and should be integrated

reasoning used to generate own or alternate solutions	be used in making informal statistical inferences.	operations. **DCS.F.1.1** Implement procedures to find the nth term in an arithmetic or geometric sequence using spreadsheets. **DCS.F.1.3** Implement procedures to find the sum of a finite sequence. **DCS.F.1.4** Implement procedures to find the sum of an infinite sequence and determine if the series converges or diverges.	throughout mathematics.
ELD-MA.9-12.Argue. Interpretive	**Math 1**	**Math 2**	**Math 3**
Interpret concepts in arguments by: Comparing conjectures with previously established results and stated assumptions	**NC.M1.F-IF.9** Compare key features of two functions (linear, quadratic, or exponential) each with a different representation (symbolically, graphically, numerically in tables, or by verbal descriptions).	**NC.M2.A-APR.1** Extend the understanding that operations with polynomials are comparable to operations with integers by adding, subtracting, and multiplying polynomials. **NC.M2.F-IF.1** Extend the concept of a function to include geometric transformations in the plane by recognizing that: • the domain and range of a transformation function f are sets of points in the plane; • the image of a transformation is a function of its pre-image.	**NC.M3.A-APR.7a** Understand the similarities between arithmetic with rational expressions and arithmetic with rational numbers. a. Add and subtract two rational expressions, $aa(xx)$ and $bb(xx)$, where the denominators of both $aa(xx)$ and $bb(xx)$ are linear expressions. **NC.M3.A-APR.7b** Understand the similarities between arithmetic with rational expressions and arithmetic with rational numbers. b. Multiply and divide two

		NC.M2.F-IF.2 Extend the use of function notation to express the image of a geometric figure in the plane resulting from a translation, rotation by multiples of 90 degrees about the origin, reflection across an axis, or dilation as a function of its pre-image. **NC.M2.F-IF.9** Compare key features of two functions (linear, quadratic, square root, or inverse variation functions) each with a different representation (symbolically, graphically, numerically in tables, or by verbal descriptions).	rational expressions. **NC.M3.F-IF.1** Extend the concept of a function by recognizing that trigonometric ratios are functions of angle measure. **NC.M3.F-IF.9** Compare key features of two functions using different representations by comparing properties of two different functions, each with a different representation (symbolically, graphically, numerically in tables, or by verbal descriptions). **NC.M3.F-LE.3** Compare the end behavior of functions using their rates of change over intervals of the same length to show that a quantity increasing exponentially eventually exceeds a quantity increasing as a polynomial function.
Interpret concepts in arguments by: Distinguishing correct from flawed logic	**NC.M1.A-REI.10** Understand that the graph of a two variable equation represents the set of all solutions to the equation.	**NC.M2.A-REI.1** Justify a chosen solution method and each step of the solving process for quadratic, square root and inverse variation equations using mathematical reasoning.	**NC.M3.S-IC.6** Evaluate articles and websites that report data by identifying the source of the data, the design of the study, and the way the data are graphically displayed.
Interpret concepts in arguments by: Evaluating relationships among evidence and mathematical principles to create	**NC.M1.G-GPE.4** Use coordinates to solve geometric problems involving polygons algebraically • Use coordinates to compute perimeters of polygons and	**NC.M2.A-REI.1** Justify a chosen solution method and each step of the solving process for quadratic, square root and inverse variation equations using mathematical reasoning.	**NC.M3.S-IC.3** Recognize the purposes of and differences between sample surveys, experiments, and observational studies and understand how randomization should be used in

generalizations	areas of triangles and rectangles. • Use coordinates to verify algebraically that a given set of points produces a particular type of triangle or quadrilateral. **NC.M1.G-GPE.5** Use coordinates to prove the slope criteria for parallel and perpendicular lines and use them to solve problems. • Determine if two lines are parallel, perpendicular, or neither. • Find the equation of a line parallel or perpendicular to a given line that passes through a given point.		each.
ELD-MA.9-12.Argue. Interpretive	**Math 4**	**Discrete Math**	**Precalculus**
Interpret concepts in arguments by: Comparing conjectures with previously established results and stated assumptions	**NC.M4.AF.5.2** Compare residuals and residual plots of non-linear models to assess the goodness-of-fit of the model.	**DCS.N.4.4** Explain theorems related to greatest common factor, least common multiple, even numbers, odd numbers, prime numbers, and composite numbers	*Note: Standard 1 applies across standards and should be integrated throughout mathematics.
Interpret concepts in arguments by: Distinguishing correct from flawed logic	**NC.M4.SP.3.1** Implement discrete probability distributions to model random phenomena and make decisions (e.g., expected value of playing a game, etc.). **NC.M4.SP.3.2** Implement the binomial	**DCS.L.1.2** Critique logic arguments (e.g., determine if a statement is valid or whether an argument is a tautology or contradiction).	*Note: Standard 1 applies across standards and should be integrated throughout mathematics.

	distribution to model situations and make decisions.		
Interpret concepts in arguments by: Evaluating relationships among evidence and mathematical principles to create generalizations	**NC.M4.SP.3.3** Recognize from simulations of sampling distributions of sample means and proportions that a normal distribution can be used as an approximate model in certain situations.	**DCS.L.1.1** Construct truth tables that encode the truth and falsity of two or more statements.	*Note: Standard 1 applies across standards and should be integrated throughout mathematics.
ELD-MA.9-12.Argue. Expressive	**Math 1**	**Math 2**	**Math 3**
Construct mathematics arguments that: Create precise conjecture, using definitions, previously established results, and stated assumptions	**NC.M1.G-GPE.4** Use coordinates to solve geometric problems involving polygons algebraically • Use coordinates to compute perimeters of polygons and areas of triangles and rectangles. • Use coordinates to verify algebraically that a given set of points produces a particular type of triangle or quadrilateral. **NC.M1.G-GPE.5** Use coordinates to prove the slope criteria for parallel and perpendicular lines and use them to solve problems. • Determine if two lines are parallel, perpendicular, or neither. • Find the equation of a line parallel or perpendicular to a given line that passes through a	**NC.M2.G-CO.5** Given a geometric figure and a rigid motion, find the image of the figure. Given a geometric figure and its image, specify a rigid motion or sequence of rigid motions that will transform the pre-image to its image. **NC.M2.G-SRT.6** Verify experimentally that the side ratios in similar right triangles are properties of the angle measures in the triangle, due to the preservation of angle measure in similarity. Use this discovery to develop definitions of the trigonometric ratios for acute angles.	**NC.M3.F-TF.2a** Build an understanding of trigonometric functions by using tables, graphs and technology to represent the cosine and sine functions. a. Interpret the sine function as the relationship between the radian measure of an angle formed by the horizontal axis and a terminal ray on the unit circle and its y coordinate. **NC.M3.F-TF.2b** Build an understanding of trigonometric functions by using tables, graphs and technology to represent the cosine and sine functions. b. Interpret the cosine function as the relationship between the radian measure of an angle formed by the horizontal axis and a terminal ray on the unit circle and its x coordinate.

	given point. **NC.M1.F-LE.1** Identify situations that can be modeled with linear and exponential functions, and justify the most appropriate model for a situation based on the rate of change over equal intervals. **NC.M1.N-RN.2** Rewrite algebraic expressions with integer exponents using the properties of exponents. **NC.M1.F-BF.1a** Write a function that describes a relationship between two quantities. a. Build linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two ordered pairs (include reading these from a table).		
Construct mathematics arguments that: Generalize logical relationships across cases	**NC.M1.F-BF.2** Translate between explicit and recursive forms of arithmetic and geometric sequences and use both to model situations	**NC.M2.G-SRT.6** Verify experimentally that the side ratios in similar right triangles are properties of the angle measures in the triangle, due to the preservation of angle measure in similarity. Use this discovery to develop definitions of the trigonometric ratios for acute angles.	*Note: Standard 1 applies across standards and should be integrated throughout mathematics.

Construct mathematics arguments that: Justify (and refute) conclusions with evidence and mathematical principles	*Note: Any of the problem-solving standards can be integrated with this language expectation. **NC.M1.A-REI.11** Build an understanding of why the x-coordinates of the points where the graphs of two linear, exponential, or quadratic equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$ and approximate solutions using a graphing technology or successive approximations with a table of values. **NC.M1.G-GPE.4** Use coordinates to solve geometric problems involving polygons algebraically • Use coordinates to compute perimeters of polygons and areas of triangles and rectangles. • Use coordinates to verify algebraically that a given set of points produces a particular type of triangle or quadrilateral **NC.M1.G-GPE.5** Use coordinates to prove the slope criteria for parallel and perpendicular lines and use them to solve problems. • Determine if two lines are parallel, perpendicular, or neither.	*Note: Any of the problem-solving standards can be integrated with this language expectation. **NC.M2.A-REI.1** Justify a chosen solution method and each step of the solving process for quadratic, square root and inverse variation equations using mathematical reasoning. **NC.M2.A-REI.2** Solve and interpret one variable inverse variation and square root equations arising from a context, and explain how extraneous solutions may be produced. **NC.M2.G-CO.4** Verify experimentally properties of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments. **NC.M2.G-CO.6** Determine whether two figures are congruent by specifying a rigid motion or sequence of rigid motions that will transform one figure onto the other. **NC.M2.G-CO.7** Use the properties of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.	*Note: Any of the problem-solving standards can be integrated with this language expectation. **NC.M3.A-REI.1** Justify a solution method for equations and explain each step of the solving process using mathematical reasoning. **NC.M3.G-CO.10** Verify experimentally properties of the centers of triangles (centroid, incenter, and circumcenter). **NC.M3.G-CO.11** Prove theorems about parallelograms. • Opposite sides of a parallelogram are congruent. • Opposite angles of a parallelogram are congruent. • Diagonals of a parallelogram bisect each other. • If the diagonals of a parallelogram are congruent, then the parallelogram is a rectangle. **NC.M3.S-IC.4** Use simulation to understand how samples can be used to estimate a population mean or proportion and how to determine a margin of error for the estimate.

	• Find the equation of a line parallel or perpendicular to a given line that passes through a given point. **NC.M1.G-GPE.6** Use coordinates to find the midpoint or endpoint of a line segment.	**NC.M2.G-CO.8** Use congruence in terms of rigid motion. Justify the ASA, SAS, and SSS criteria for triangle congruence. Use criteria for triangle congruence (ASA, SAS, SSS, HL) to determine whether two triangles are congruent**.** **NC.M2.G-CO.9** Prove theorems about lines and angles and use them to prove relationships in geometric figures including: • Vertical angles are congruent. • When a transversal crosses parallel lines, alternate interior angles are congruent. • When a transversal crosses parallel lines, corresponding angles are congruent. • Points are on a perpendicular bisector of a line segment if and only if they are equidistant from the endpoints of the segment. • Use congruent triangles to justify why the bisector of an angle is equidistant from the sides of the angle. **NC.M2.G-CO.10** Prove geometric theorems. Prove theorems about triangles and use them to prove relationships in geometric figures including:	

		• The sum of the measures of the interior angles of a triangle is 180º. • An exterior angle of a triangle is equal to the sum of its remote interior angles. • The base angles of an isosceles triangle are congruent. • The segment joining the midpoints of two sides of a triangle is parallel to the third side and half the length. **NC.M2.G-SRT.1** Verify experimentally the properties of dilations with given center and scale factor: a. When a line segment passes through the center of dilation, the line segment and its image lie on the same line. When a line segment does not pass through the center of dilation, the line segment and its image are parallel. b. The length of the image of a line segment is equal to the length of the line segment multiplied by the scale factor. c. The distance between the center of a dilation and any point on the image is equal to the scale factor multiplied by the distance between the	

		dilation center and the corresponding point on the pre-image. d. Dilations preserve angle measure.	
Construct mathematics arguments that: Evaluate and extend others' arguments	**NC.M1.S-ID.9** Distinguish between association and causation.	**NC.M2.G-CO.9** Prove theorems about lines and angles and use them to prove relationships in geometric figures including: • Vertical angles are congruent. • When a transversal crosses parallel lines, alternate interior angles are congruent. • When a transversal crosses parallel lines, corresponding angles are congruent. • Points are on a perpendicular bisector of a line segment if and only if they are equidistant from the endpoints of the segment. • Use congruent triangles to justify why the bisector of an angle is equidistant from the sides of the angle. **NC.M2.G-CO.10** Prove theorems about triangles and use them to prove relationships in geometric figures including: • The sum of the measures of the interior angles of a triangle is 180º. • An exterior angle of a triangle is	**NC.M3.S-IC.5** Use simulation to determine whether observed differences between samples from two distinct populations indicate that the two populations are actually different in terms of a parameter of interest.

		equal to the sum of its remote interior angles. • The base angles of an isosceles triangle are congruent. • The segment joining the midpoints of two sides of a triangle is parallel to the third side and half the length.	
ELD-MA.9-12.Argue. Expressive	**Math 4**	**Discrete Math**	**Precalculus**
Construct mathematics arguments that: Create precise conjecture, using definitions, previously established results, and stated assumptions	**NC.M4.SP.1.3** Organize large datasets of real-world contexts (i.e. datasets that include 3 or more measures and have sample sizes >200) using technology (e.g., spreadsheets, dynamic data analysis tools) to determine: types of variables in the data set, possible outcomes for each variable, statistical questions that could be asked of the data, and types of numerical and graphical summaries could be used to make sense of the data.	**DCS.GT.1.2** Test graphs and digraphs for Euler paths, Euler circuits, Hamiltonian paths, or Hamiltonian circuits**.** **DCS.L.1.4** Judge whether two statements are logically equivalent using truth tables.	**PC.N.1.1** Execute the sum and difference algorithms to combine complex numbers. **PC.N.1.2** Execute the multiplication algorithm with complex numbers. **PC.N.2.1** Execute the sum and difference algorithms to combine matrices of appropriate dimensions. **PC.N.2.2** Execute associative and distributive properties to matrices. **PC.N.2.3** Execute commutative property to add matrices**.** **PC.N.2.4** Execute properties of matrices to multiply a matrix by a scalar.

			PC.N.2.5 Execute the multiplication algorithm with matrices. **PC.A.2.1** Use properties of logarithms to rewrite expressions. **PC.F.5.1** Implement algebraic procedures to compose functions. **PC.F.6.2** Construct a recursive function for a sequence represented numerically.
Construct mathematics arguments that: Generalize logical relationships across cases	**NC.M4.SP.2.2** Construct confidence intervals of population proportions in the context of the data.	*Note: All of the DCS.L standards can be integrated with this language expectation.	**PC.F.4.8** Identify the conic section (ellipse, hyperbola, parabola) from its algebraic representation in standard form.
Construct mathematics arguments that: Justify (and refute) conclusions with evidence and mathematical principles	*Note: Any of the NC.M4.SP.2 standards can be integrated with this language expectation.	**DCS.N.4.3** Conclude that sets are equal using the properties of set operations. **DCS.GT.1.2** Test graphs and digraphs for Euler paths, Euler circuits, Hamiltonian paths, or Hamiltonian circuits. **DCS.L.1.1** Construct truth tables that encode the truth and falsity of two or more statements. **DCS.L.1.3** Check 1s and 0s to determine whether a statement is true or false using Boolean logic circuits	**PC.F.5.7** Use composition to determine if one function is the inverse of another function.

Construct mathematics arguments that: Evaluate and extend others' arguments		**DCS.L.1.2** Critique logic arguments (e.g. determine if a statement is valid or whether an argument is a tautology or contradiction). **DCS.L.1.4** Judge whether two statements are logically equivalent using truth tables.	

Works Cited

WIDA. *WIDA English Language Development Standards Framework, 2020 Edition: Kindergarten–Grade 12*. Board of Regents of the University of Wisconsin System, 2020.